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Fla State Horticultural Society

Horticultural Society Meets In Winter Haven

- By -

BAYARD F. FLOYD, SECRETARY,
FLORIDA STATE
HORTICULTURAL SOCIETY

The Florida State Horticultural Society will hold its Fifty-first Annual Meeting in Winter Haven on April 12, 13 and 14, 1938.

With this meeting the Society completes its first fifty years of existence. Its development during this period has been inseparable from the development of horticure in Florida.

Following the freeze of 1894-95, it was the meeting ground of the citrus growers to discuss and decide upon plans for rebuilding their groves. It was in Winter Haven that the movement originated under the guidance of Dr. Inman that resulted in the formation of the Florida Citrus Exchange. It was here that the first plans were formulated to eradicate citrus canker, and upon the Society's recommendation the State legislature passed the Plant Act establishing the State Plant Board. It was of assistance in formulating methods of control of the citrus white flies. It was a factor in eradication of the Mediterranean fruit fly. It has been the forum for the discussion of all grove practices, varieties, et cetera. It begins its fifty-first year with the citrus industry in a very sick and chaotic condition, and it is hoped that the program of this year will develop plans for some relief.

Speakers of prominence in Florida and California are being invited to discuss the situation. Other topics for discussion will include various phases of citrus fruit production such as the symptoms of plant food deficiencies in the tree and fruit and methods of prevention and correction, diseases and pests of citrus trees, production problems in various sections of the state, the influence of various factors on the maturity of citrus fruits, cold injury to fruit and methods of grove heating. With the problems confronting the industry, it is anticipated that this will be a very important meeting.

The citizens of Winter Haven are preparing for a large meeting and are planning entertainment that they expect to exceed that of the Ocala meeting. The Cypress Gardens are delaying the holding of their Third Annual Gardenia Festival so that it will be held during the meeting of the Society, and in connection with it they will stage a pageant on the afternoon of Wednesday, April 13th. The members of the Society are to be the guests of the Gardens on that afternoon.

The Garden Clubs of Winter Haven will stage their annual Flower Show during the meeting, and the Florida Rose Society will hold their Thirteenth Annual Meeting and Rose Show. Plans are also under way to stage a gladiolus Show.

Opportunity will be given the members to visit the Citrus Experiment Station at Lake Alfred and the Citrus Products Laboratory of the United States Department of Agriculture. At the former place, Dr. Camp and members of his staff will conduct members of the Society through the station's grove plots and identify for them the symptoms of various food deficiencies. This should be invaluable to those growers who are unable to recognize these symptoms at present.

The Krome Memorial Institute will hold its Sixth Annual Meeting on Wednesday evening, April 13th. Its program is devoted to the discussion of sub-tropical fruits, exclusive of citrus. An excellent program that will include the discussion of avocadoes, mangos, limes, guavas and other sub-tropical fruits is being arranged.

The Horticultural Society meeting of this year promises to be spectacular, instructive and helpful, and a large attendance is anticipated.

27,620 SLASH PINES PLANTED

Members of the Bay County 4-H forestry club at Panama City have planted a total of 27,620 slash pine seedlings during the past two seasons, according to County Agent John G. Hentz, Jr. The club's membership is now larger than it has been since its organization.

1. Nurseries
2. Citrus fruits, Florida

Citrus Plantings In Florida

: By :
ARTHUR C. BROWN
Grove Inspector
State Plant Board

The extent of the citrus plantings in Florida is indicated from time to time by tabulations prepared by the State Plant Board showing the number of citrus trees inspected during one complete coverage of the State. Such "tree counts" were prepared in 1919, 1923, 1928, 1931, and 1934. Totals presented are at variance with figures compiled by other agencies. Reason is that there is included in the Board's record every tree inspected — abandoned plantings, hammock trees, sour and bitter sweet oranges, rough lemons, and back yard plantings in towns and cities. Other records deal mainly with commercial plantings.

The last tabulation prepared by the Board was in December, 1934. At that time there were recorded 26,064,773 citrus trees, of which 15,853,729 were oranges, 6,456,389 were grapefruit, 1,877,779 were tangerines, 749,589 were Satsumas, and the balance, composed of lemons, limes, Kumquats, etc., totaled 1,127,287.

Some idea may be formed of the increase in plantings and the variety shift since December, 1934, by a study of the records of the Board's Nursery Inspection Department. As a result of the costly leson learned of tremendous value in the event that it became necessary to locate and inspect at destination trees shipped from nurseries found at a later date to be affected with a major pest, these records are not complete from a statistical viewpoint. Nurserymen in reporting the movement of a block of citrus trees frequently list the number sold by species and not the variety. Such trees are listed in the tabulations as "unnamed varieties.".

Thus, while a fairly accurate record of the total special movement is available, exact figures on varieties are lacking. Again, nursery trees produced by a grower and set out on his own property are not recorded at Gainesville. All trees reported by nurserymen cannot be regarded as being new plantings, for many of them are used as replacements. The freeze of December 1934, undoubtedly required the replacement of many grove trees.

Some idea of the extent of the movement of citrus trees from nurseries during the past several years may be formed from a study of the following tabulations as compiled by the Division of Agricultural Economics, Florida Agricultural Experiment Station, Gainesville, Fla.: during the early days of the citrus canker eradication project, when it was absolutely necessary, but almost impossible, to trace for inspection at destination every tree shipped from canker infested nurseries, the State Plant Board requires the recording in Gainesville of all nursery stock moved under certification. Thus there is on file a more or less complete record of every citrus tree moved from commercial nurseries during the course of each fiscal year. While

Total Number of Citrus Trees Moved During the Fiscal Years 1933-34, 1934-35, 1935-36, 1936-37, as Reported to the State Nursery Inspector, Gainesville, Florida

Year	Oranges	Grapefruit	*Mandarin	Limes	Lemons	**Miscellaneous	Total
1933-34	440,429	158,471	74,187	40,616	22,438	17,919	754,060
1934-35	351,289	89,468	30,880	33,666	11,486	10,930	527,719
1935-36	530,564	153,986	34,128	61,207	29,472	13,036	822,393
1936-37	746,849	106,421	38,427	123,054	19,381	21,855	1,055,987
TOTAL	2,069,131	508,346	177,622	258,543	82,777	63,740	3,160,159

* Satsumas, tangerines, Temples, etc.
** Kumquats, tangelos, citrons, hybrids, etc.

GRAPEFRUIT

Number of Grapefruit Trees, by Varieties, Moved From Florida Nurseries from July 1, 1928 to June 30, 1937

Year	Marsh	Duncan	Conner's Early	Foster	Thompson	Walters	McCarty	Excelsior	Unnamed	Miscellaneous	Total
1928-29	151,776	42,379	23,039	3,225	1,607	4,523	10,551	14,863	52,075	1,603	305,641
1929-30	122,459	48,405	21,349	2,819	1,671	6,722	4,673	28,702	82,244	11,222	330,266
1930-31	110,189	28,818	25,272	1,041	1,955	912	778	16,298	72,851	6,689	264,803
1931-32	29,511	3,622	7,279	5,029	7,654	553	384	2,261	15,440	1,668	73,401
1932-33	66,389	8,356	11,818	6,752	12,445	658	1,236	6,157	29,936	850	144,597
1933-34	69,213	7,332	6,747	11,293	31,139	525	624	3,890	26,393	1,315	158,471
1934-35	33,501	2,383	1,892	5,869	18,762	297	156	4,606	21,256	746	89,468
1935-36	49,580	8,629	672	8,669	34,132	90	261	3,055	45,816	3,082	153,986
1936-37	37,098	6,546	774	6,924	32,877	603	1,019	3,329	16,521	730	106,421
Total	669,716	156,470	98,842	51,621	142,242	14,883	19,682	83,161	362,532	27,905	1,627,054

(Continued on page 19)

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JACKSONVILLE, FLORIDA

Pecan Shuckworm

The Control Of The Pecan Shuckworm

BY J. R. WATSON
ENTOMOLOGIST, FLORIDA EXPERIMENT STATION

If you will look into almost any pecan tree in a door yard you will see a considerable number of shucks still clinging to the trees. Why did not these shucks fall with the nuts in the fall as normal shucks should? Knock off several of these clinging shucks and break them open and you will discover the reason. You will find one or more worms inside of most of them. This is the pecan shuckworm. It is one of the most destructive pests of pecans, vying with the nut casebearer for the distinction of being pecan enemy number one.

The eggs from which these worms hatched were laid in the early fall. In about a week the eggs are hatched and the worms entered the shucks where they continued to feed during the fall and early winter. As a result of this feeding they cut the sap conducting vessels of the nuts. those tissues that carry the sap into the shucks and nourish not only the shuck but the nut as well. The cutting of these vessels causes the shuck to shrivel up and cling to the tree insteal of dropping as a normal shuck would.

These worms in the shucks are now practically full grown and will soon be pupating. Before they pupate the worms will bore their way to near the surface of the shuck, from which position the moth can easily emerge. The moth is a little thing, outstretched wings, the fore pair of which are blackish brown in color and the hind ones brownish yellow. It does not fly around much and consequently is seldom noticed in a pecan grove. These moths hatching out from worms now in the shucks will emerge normally in late March or early April.

The first brood of moths in 1938 will lay its eggs mostly in the phyloxera galls of hickories and pecans. Phyloxera galls are those swellings on the leaves and stems which when broken open will show large numbers of aphids inside. Here the larvae of the first generation in the spring will live, doing very little harm to the pecans, but in about a month these larvae will in turn become full grown and will pupate. They will remain in the pupal stage from 19 to 32 days and then, in the late spring, the second brood will emerge. By this time the young nuts will be hanging to the trees and the eggs will be laid on them. These eggs will hatch in from five to seven days and the larvae will bore into the young nuts which, as a result of the feeding of the larvae, will promptly drop. If the infestation is heavy this dropping of the young nuts will be very serious and may account to a major portion of the crop.

A third brood hatching out later in the summer will do the same type of work but if some of the nuts have become large by this time may not drop but will shrivel up and hang to the trees. Kernels will not be developed and the nuts, of course, will be worthless.

The fourth or fifth brood (sometimes there are four and sometimes five broods in a season in Florida) is the one which will go through the winter. Nuts attacked by last brood may not drop but will usually be delayed in their maturity and will be scarred by the larvae. When shelled a portion of the shuck will often stick to the nut. These scarred nuts with a portion of the shuck sticking to them will not bring as good a price as uninfested nuts.

So, the pecan shuckworm hits the pocketbook of the grower from four directions. First, and most important of all, is the total destruction of the young nuts in the late spring or summer. Second, the shrivelled kernels or kernels insufficiently developed (in other words, light nuts) are caused by this pest. This is caused by the larvae cutting off the food vessels which ordinarily feed the young nuts, which results in their failing to develop properly. Third, the scarring of the nuts as mentioned above, and fourth, by delaying the maturity so that at harvesting time many of the nuts are still green, necessitating a second harvesting, which often is not profitable as the nuts are of such poor quality.

Now as to control measures. These worms are now pupating and the moths will emerge soon. The proper procedure is to knock off the shucks hanging to the trees and rake them and burn them. It, of course, will be understood that they should not be piled too near the trees which the fire might scorch. However, unless the nuts were gathered in sheets last fall and placed in piles it will be difficult to get them all, so a second control is advised — plowing the grove. This plowing, to be effective, should be done after the larvae have pupated but before the moths have emerged. We mentioned that when about to pupate the worms dig their way out to the surface of the nut where they pupate so the moths can easily emerge. If the shucks are plowed under before the worms have pupated many of them will leave the nuts and dig their way up to near the surface of the soil. Here they will form pupal cases so that the moths can easily escape from the soil. If the worms have already pupated when the plowing is done the moths will be unable to escape from the ground if buried to the depth of an inch or two in stiff clay soil and three or four inches in sandy soil. Therefore the plowing should be delayed until most of the worms have pupated, but before many of the moths have emerged.

(Continued on page 18.)

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Agricultural Pests

Crop Pests In 1937

BY J. R. WATSON
Entomologist
Florida Experiment Station

At this time of the year it is a habit, and a good one, to take stock of the happenings of the past year, and as far as possible, to make some predictions of the probabilities for the coming year. As a usual thing this is difficult to do for insects as we cannot prophesy the weather and the weather has much to do with the outbreak of any particular insect.

Probably the most striking entomological development during the past year has been the marked increase of the "white fringed weevil," or as some of our growers have been calling it, the "Argentine weevil." It was discovered last year in a couple of counties in extreme north Florida and adjoining portions of Alabama. During the past year the insect has been discovered in all the gulf states from Georgia to Louisiana, inclusive, but only in a few localities in each of these states. Studies of this insect have indicated that we have here an extremely serious threat to the farming operations of those states as now conducted. In some infested fields it was estimated that there were 500,000 beetles per acre. The beetles began to emerge in the middle of June and reached their peak about the middle of July or before, but stragglers continued to be in evidence until well along in the fall. The infested fields are heavily infested with grubs and undoubtedly there will be a heavy swarm of beetles in the spring. The U. S. D. A. in cooperation with the states involved, is taking energetic measures to fight these beetles. They have quarantined the areas infested and have dug ditches around the infested farms to stop their migration. Unfortunately they started too late this past year to have much influence on the numbers of beetles which will emerge in the spring, but with the continuation of these energetic measures there should be a marked diminution of their numbers.

Characteristic of last winter was an extremely warm January. The average temperature for that month was only a degree or two below normal for April. With practically April weather in January it was to be expected that April insects would appear, and they did. One of these was the tomato pin worm. This insect usually appears in considerable numbers in the northern part of the state along towards the end of the picking season, but except in one or two of the most southern counties it is of little commercial importance usually, as the picking season is about over when it appears in any numbers, but this year it appeared so early that it did severe damage to seed beds. The prospects of making much of a crop in the southern counties seemed at that time to be rather remote, but parasites attacked the pin worm in large numbers and although losses were heavy duriny the picking season, most of the growers were able to produce a good crop in spite of the pin worm.

In cooperation with the State Plant Board we were able to employ a man to study the life history of this insect for a couple of months in the spring. As a result of this work we are now better acquainted with its life history, parasites, etc., and in better position to give advice if the insect again appears in destructive numbers during the marketing period. One development in this line was the rather surprising discovery that infested tomatoes usually held up very well in spite of the holes made by the pin worm, well enough so that under ordinary circumstances they would reach the consumer without heavy losses.

Of the citrus insects, we had perhaps the heaviest infestation of aphids since the spring of 1925. This again is directly due to the warm weather of January which caused considerable new growth on young trees and consequently there was abundant food for aphids during the winter. This was augmented by the cold during the early part of last winter which took the leaves off of many trees and the warm weather of January caused these defoliated or partly defoliated trees to put out new growth. This was responsible for the heavy crop of aphids. We might here warn the growers that these same conditions have been repeated this year. In many sections the severe frost of the 7th and 8th of December has caused extensive defoliation. If the warm weather we are now experiencing continues these defoliated or partly defoliated trees will undoubtedly put out new growth and supply food for aphids, which will increase in numbers and the history of last year may very easily be repeated. Therefore our growers should take particular pains to destroy all colonies of aphids during the month. The aphids will be mostly out on the ends of the branches of young trees, which can be bent into a bucket containing a little nicotine sulphate or pyrethrum compound. This should give a thorough kill.

Rust mites seemed to have survived the cold of last winter and of course increased rapidly during the warm weather of January. Probably our citrus growers as a whole fought insects last year better than they ever have before, for which the publicity resulting from the Better Fruit Campaign was largely responsible. Furthermore, progress was made in developing combination sprays for scale insects, rust mites, and the more rare mineral plant foods, such as zinc and copper, which have been found so beneficial in combatting deficiency diseases.

In the peninsula part of Florida the southern green stink bug, or "pumpkin bug," was again rather scarce. We expected this because of the heavy parasitization of the previous year. We may expect in 1938 somewhat more of this pest on citrus than in the past year, but hardly a heavy infestation. Some pyrethrum dusts which have been tried out at our citrus sub-station seem to give promise of being able to kill these very sturdy insects, for which we have previously had no dust or spray which was effective and safe to use on citrus trees.

On the other hand, in the extreme western part of the state these pumpkin bugs have been unusually abundant and destructive, even attacking such crops as corn in the

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Agricultural Research

Scientific Research Into Medicinal Values Of Citrus

Scientific research in the medicinal and nutritional values of grapefruit, oranges and tangerines will be undertaken by the Florida Citrus Commission under a program recently adopted, which also continues the chemical research work in citrus fruits which was started two years ago.

Eminent nutritionists and chemists will be asked to serve on a board to advise the Commission in studies to develop new information about the food and health values of Florida fruits, and in the dissemination of information already developed.

Employment of a qualified bibliographer to search all literature bearing upon the nutritional, medicinal and chemical properties of citrus fruits and to correlate this information for publication and distribution to the medical and dental professions, also was authorized.

The Commission's new research program was adopted following a recent plea by Dr. P. Phillips, Orlando shipper, that it promote the sale of Florida fruits by developing new information about its health values. In the selection of an advisory committee of scientists it will be assisted by Dr. A. W. Thomas, of Columbia University, who has directed its chemical research.

Acting upon the request of growers and shippers that it support an effort to advance the time for selling Florida fruit on the New York auction market, the Commission adopted a resolution calling upon the United States Department of Agriculture, through the state agricultural extension service, to make a complete survey of the present methods of selling Florida fruits and other farm crops at auction in New York, and make recommendations for any changes in the system which it finds desirable.

Extension to June 1 of the effective date for its embossing regulation for canned citrus products was approved. C. E. Lindsey, Lakeland canner and John B. Sutton, Tampa attorney, representing canners, told the Commission that immediate enforcement of the embossing law, upheld last week by a three-judge federal court, would create confusion in the trade and seriously handicap the canning industry.

Chairman John Maxcy and secretary R. E. Bateman were authorized to sign briefs being prepared in behalf of the three citrus producing states, calling upon the federal government to obtain concessions for grapefruit, oranges and tangerines in the proposed trade agreements with Great Britian and Canada, which will promote their exportation.

On recommendation of its advertising committee the Commission declined to consider several proposals to engage in the sale and manufacture of juice extractors. The committee found that others are about to manufacture extractors which will satisfactorily handle Florida fruit, and recommended that more effective results in increasing fountain sales of citrus fruits can be obtained through direct advertising and promotional work.

L. W. Marvin, advertising manager, reported that more than 70,000 Emily Post booklets, "How to Get the Most Out of Life" had been requested the last few weeks by people listening to the Florida citrus radio program broadcast by Mrs. Post twice a week over a Columbia network.

Plans for special sales campaigns on oranges by the 189,000 stores represented by the National Association of Food Chains and the Independent Food Distributors Council, which started February 24, were explained by Mr. Marvin, who also reported that simultaneously the National Association of Drug Chain Stores will launch a sales compaign on Florida grapefruit and orange juice.

Drug stores throughout states where Florida citrus fruits are sold will launch a special campaign this month to increase their fountain sales, Marvin said.

The campaign will be sponsored by the National Association of Chain drug stores in cooperation with the Commission, which asked its help in promoting the consumption of Florida fruit juices. Four thousand drug stores, including all of the large chains will participate.

Last season the chain drug stores supported the national grapefruit promotion with a special sale on grapefruit juice. Orange juice is included in this year's campaign to support the national promotion of this fruit to be staged by the National Association of Food Chains and the Independent Food Distributors Council.

"After the success of last year's grapefruit juice drive we look forward to active and enthusiastic participation of all members in what should prove to be the greatest citrus juice drive ever conducted," Fred J. Griffiths secretary of the National Association of Chain Drug Stores, has advised Mr. Marvin.

Special displays of Florida grapefruit and oranges will be featured by the chain drug stores during their campaign on these fruit juices. Many of them will prepare their own display posters, while others will use new advertising posters for fountain mirrors furnished by Commission.

"One of the principal objectives of our current advertising effort is to increase drug store fountain sales of Florida citrus juices," said Marvin. "With the splendid cooperation we

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NO MARKETING AGREEMENT THIS SEASON

Attempts of various groups in the industry to formulate a marketing agreement which would meet with the approval of the Agricultural Adjustment Administration have definitely failed insofar as the present shipping season is concerned.

Basing its refusal to approve the latest plan submitted on the ground that there was such wide difference of opinion between various groups in the industry, the Administration expressed the hope that some long-range plan might be worked out for control of the industry in the future seasons.

If any such plan is to be agreed upon by the numerous groups of growers and shippers, it will be necessary that steps toward such solution be taken at once to the end that the plan may be submitted before the beginning of the next shipping season.

Failure to secure a working agreement during the present season is due largely to the fact that no effort was made to bring the conflicting interests together on some plan acceptable to the Administration until after the shipping season was well under way, when it was too late to reconcile the differences existing.

If the industry is to have an agreement next season, it is not too early to begin now to work out some plan which will meet with the approval of Florida growers and shippers and which will be acceptable to the Administration.

CHAIN STORES TO AID ORANGE SALES

Plans of 37,000 national chain stores and 152,000 independents to aid Florida orange growers in disposing of their bumper crop of fruit, are now under way. Beginning on February 24, these grocery stores pushed the sale of Florida oranges for a full week. On March 24 will begin the second week of the orange sales and on April 21 the final week of featuring Florida oranges in the grocery stores of the nation will begin.

A campaign of the chain stores last year was credited with strengthening the grapefruit market and winning many new consumers of Florida grapefruit.

During the progress of the campaign for oranges, Florida citizens and visitors are being urged to aid the growers and strengthen the market by shipping full boxes of Florida oranges to friends and relatives outside the state.

Orange growers are hopeful that the campaign of the grocery stores may result as beneficially to oranges this year as the campaign for grapefruit did last season.

LAW LIMITING TRUCK WEIGHTS MAY BE MODIFIED

Chairman John Maxcy of the Florida Citrus Commission, returning from a trip to South Carolina, brings the good news that the officials of that state are inclined to go slow in the matter of enforcing the state law limiting the weight of trucks carrying Florida citrus fruits.

The South Carolina legislature, it is said, is considering modification of the law, and in the meantime the enforcement officers are expected to deal leniently with the matter, so that Florida growers and shippers will not be too seriously affected by the provisions of the law which limits the weight and width of trucks to such extent that its rigid enforcement would work a decided hardship upon Florida citrus interests.

A GOOD MOVE

Dr. P. Phillips of Orlando is to be congratulated upon starting a movement for scientific research into the medicinal and food values of citrus fruits, and the Florida Citrus Commission is to be commended for taking up the idea with a view to developing new information of a scientific nature in the campaign to promote the sale of Florida citrus fruits.

Dr. Phillips has long been a leader in the Florida citrus industry and has himself carried on extensive research along the lines suggested in his latest move to create new markets for Florida fruits.

HORTICULTURAL SOCIETY TO MEET

Secretary Bayard F. Floyd of the Florida State Horticultural Society announces the fifty-first annual meeting of the Society to be held in Winter Haven on April 12, 13 and 14.

Elaborate plans have been made for this meeting and Secretary Floyd states that a most valuable and interesting program is being arranged. Leading horticulturists of Florida and California will be heard and subjects covering practically every phase of citrus culture and marketing will be covered.

A starved horse cannot pull a heavy load, nor can a starved grove produce a heavy crop of quality fruit.

If early bloom counts for anything, Florida is in for another record crop of citrus this coming season.

1. Fertilizers, Citrus Fruit
2. Citrus Grove Management

Deficiency Symptom Patterns . . . In Citrus

By O. C. BRYAN
Research Director, Dolomite Products Incorporated

For many decades the feeding of plants has consisted largely in the addition of the three classical elements, nitrogen, phosphoric acid and potassium, which formerly were regarded as a complete fertilizer.

However, it has been generally recognized for some years that small quantities of a number of other elements are essential for the best growth of plants. With the general decrease in the use of farm manures and organic products as fertilizers, there has been an increased use of mineral fertilizers which frequently are of synthetic origin and of sufficient purity to exclude most of the minor elements; and many of the mixed fertilizers seem to lack the necessary minor elements. This is confirmed by abnormal off colored leaves, poor quality of crop and lack of fruitfulness. Since the feeding of the plants is the most expensive factor in Florida agriculture additional basic study regarding the nutrition of plants appears to be in order.

Crops frequently develop unhealthy symptoms indicative of a deficiency of one or more elements essential to healthy growth. In all probability a deficiency of a number of the essential elements actually has existed for many years. As a result of a better understanding of the nutrition of plants and improved chemical technique, a number of nutrient deficiencies are now recognized by investigators and it is possible to correct many of these troubles by application of the proper element to the soil or to the plant in the form of spray.

The general vigor and color of plants usually is directly related to the amount of chlorophyll, or green coloring matter, in the leaves and other green parts. In view of this it appears logical that the leaf characteristics could be used as a guide to the need of the essential elements involved in the formation of chlorophyll, which, in conjunction with light, water, carbon dioxide and minerals, is the major agency involved in the synthesis of starch and other foods by the plant. Although it is recognized that this is a complex problem not yet fully understood, nevertheless, the leaf conditions can not be overlooked in diagnosing deficiency symptoms, particularly in view of the fact that these symptoms are more readily detected in the leaves than in any other plant parts. This naturally would be expected because the leaves are the seat of the manufacturing process.

The fact that each element in nature has specific properties not duplicated by other elements, made possible the discovery and identification of the various elements. Where an element is essential for the growth of plants and animals it would be only logical to assume that each element, regardless of the number, would have a specific function in the plant as well as in the animal, because of the individual characteristics of the elements themselves. This has been recognized by research workers in the treatment of physiological diseases of plants and animals.

Of course it should be understood that while each plant has certain characteristics peculiar to itself, as well as the elements, a wide range exists because nature rarely produces identical leaves or fruit even on a given tree. Nevertheless, it is remarkable how similar the deficiency symptoms of one element develop on the leaves of a wide range of plants. For example, a nitrogen deficiency produces a uniform cast of yellow color or a shortage of green coloring matter in the leaves of most plants. Since nitrogen is required in large amounts and is usually the most deficient element, its deficiency symptoms are generally recognized. But other elements perform other functions and their deficiencies are reflected differently in the leaves.

Within certain limits, each element produces a deficiency symptom* pattern that is specifically associated with that element and may be recognized and differentiated from other patterns with comparative ease and readiness once the pattern is recognized for a given plant. Strange as it may appear, most of these patterns are sufficiently distinct to be recognized by leaf symptoms in citrus regardless of color. Unless one is careful, the various shades of green and yellow may be confusing because most nutritive elements influence chlorophyll development, thereby affecting color, and the various stages of green and yellow occasioned by different degrees of deficiency would likely overshadow the specific patterns revealed by each element.

The object of this paper is to describe and illustrate representative deficiency patterns in citrus for each of the elements about which definite information is available. By so doing, it is believed that growers and others interested in the production of citrus will gain a clearer insight into their fertilization problems and be in better position to manage and prescribe for groves. Deficiency patterns for the following elements appear to be sufficiently well defined to warrant presentation here, namely: nitrogen, phosphorous, potassium, calcium, magnesium, iron, manganese, copper, boron, and zinc. When more is known about the nutrition of citrus, it is very probable that deficiency patterns for other elements will be recognized, and our views concerning those presented herein modified somewhat.

SYNOPSIS OF DEFICIENCY PATTERN SYMPTOMS

(1) Nitrogen.—Characterized by a general yellowing of the leaves over the entire plant with greater severity on fruiting branches. The individual leaves show a uniform loss of chlorophyll, resulting in a pale yellowish-green to old ivory color in extreme cases, but no abnormalities of the veins (Figure II). Severely affected trees are characterized by a lack of growth and fruiting. In the case of bark diseases,, root pruning or any cause affecting the sap flow of the plants, the midrib and lateral veins of leaves lose cholorophyll before the leaf tissue producing an inverted frenching effect. This symptom has been associated with possible nitrogen deficiency; Barht (1) and Hughes report that it is a type of magnesium

*A deficiency symptom is herein considered as insufficient amounts (available) or improper ratios of nutrient elements for normal development.

deficiency. But field observations, indicate that it is not a typical deficiency of either of these elements. (1, 4, 5).

(2) Phosphorus. — Symptoms of phosphorus deficiency in citrus have not been recognized in the field. However, according to Haas of California, under controlled experimental conditions, citrus leaves tended to become small, lusterless, brownish-green, bronzed, and brittle. Under severe conditions irregularly scattered, burned areas occur on the leaves and a marked absence of branching of the shoots. (10).

(3) Potassium. — Symptoms of potassium deficiency have not been recognized with any particular frequency in the field but have been produced under controlled experimental conditions. A shortag of this element is characterized by rapid growth and over-sized leaves which often show a puckered or crinkled appearance. The terminal branches show lack of rigidity and tend to droop, gum, and die back. In advanced cases the leaves develop a light yellow to bronze irregular pustular appearance which gradulally becomes brown to rust-like and necrotic with breaking down of the tissues, somewhat suggestive of melanose, (Figure II). In severe cases trees produce scant or no fruit. (2, 5, 13).

(4) Calcium. — Characterized by a marked stunted condition of the trees with hardened bark and lack of response to fertilizer. The flushes of new growth are short and show a tendency to die back. The leaves rarely show characteristic deficiency symptoms in the field. However, under controlled experimental conditions they develop an over-green color in the early stages of the deficiency, but in advanced stages the tips and edges develop a yellow color which works toward the center and leaf base. Figure II). This deficiency usually occurs on strongly acid soils and on soils receiving low amounts of calcium in the fertilizer. (Unpublished data).

(5) Magnesium Deficiency. — A variety of symptoms develop progressively in the leaves but usually all the different stages can be seen on markedly affected trees. In the early stages a series of yellow areas develop on each side of the midrib. Later these areas coalesce to form a well-defined streak which is widest at the base and narrowest toward the tip, resulting in a somewhat inverted V-shaped area of green immediately along the midrib, (Figure I). A pronounced yellow or bronzed appearance (light in the illustration) develops as the chlorophyll fades (including lateral veins as well as leaf tissue) and in the late stages practically all of the chlorophyll may be lost leaving a solid bronze color. This bronzed condition may occur on any soil but is more prounonced in late summer and fall, particularly on heavily fruiting trees or branches. Severely affected trees shed their older leaves early, so that a sparse foilage results. This deficiency rarely occurs on young leaves. It is commonly designated as **Bronzing in Florida.** (1,13).

(6) Iron. — Characterized by the development of a general chlorotic condition of the leaves, particularly the younger ones, with the veins retaining their chlorophyll longer than the leaf tissue, so that they appear as a fine green network, (Figure II). In severe cases, the terminal leaves may be greatly reduced in size and very chlorotic producing a color of old ivory. In such cases, the terminal shoots become defoliated with a stunted growth and unproductive trees which decline with age.

Mild forms of iron deficiency may occur on light sandy soils, but severe and chronic cases are associated invariably with marly and over limed soils. (7, 9).

(7) Copper. — (Technically known as a physiolegical disease Exanthema). A large variety of conditions and cultural practices are known to contribute to the development of this condition. This is paricularly true with clean cultured practices or any root disturbance during active growth. It has been demonstrated in Florida and subsequently in other countries that applications or injections of copper sulphate or spraying with bardeaux mixture will correct

FIGURE I.

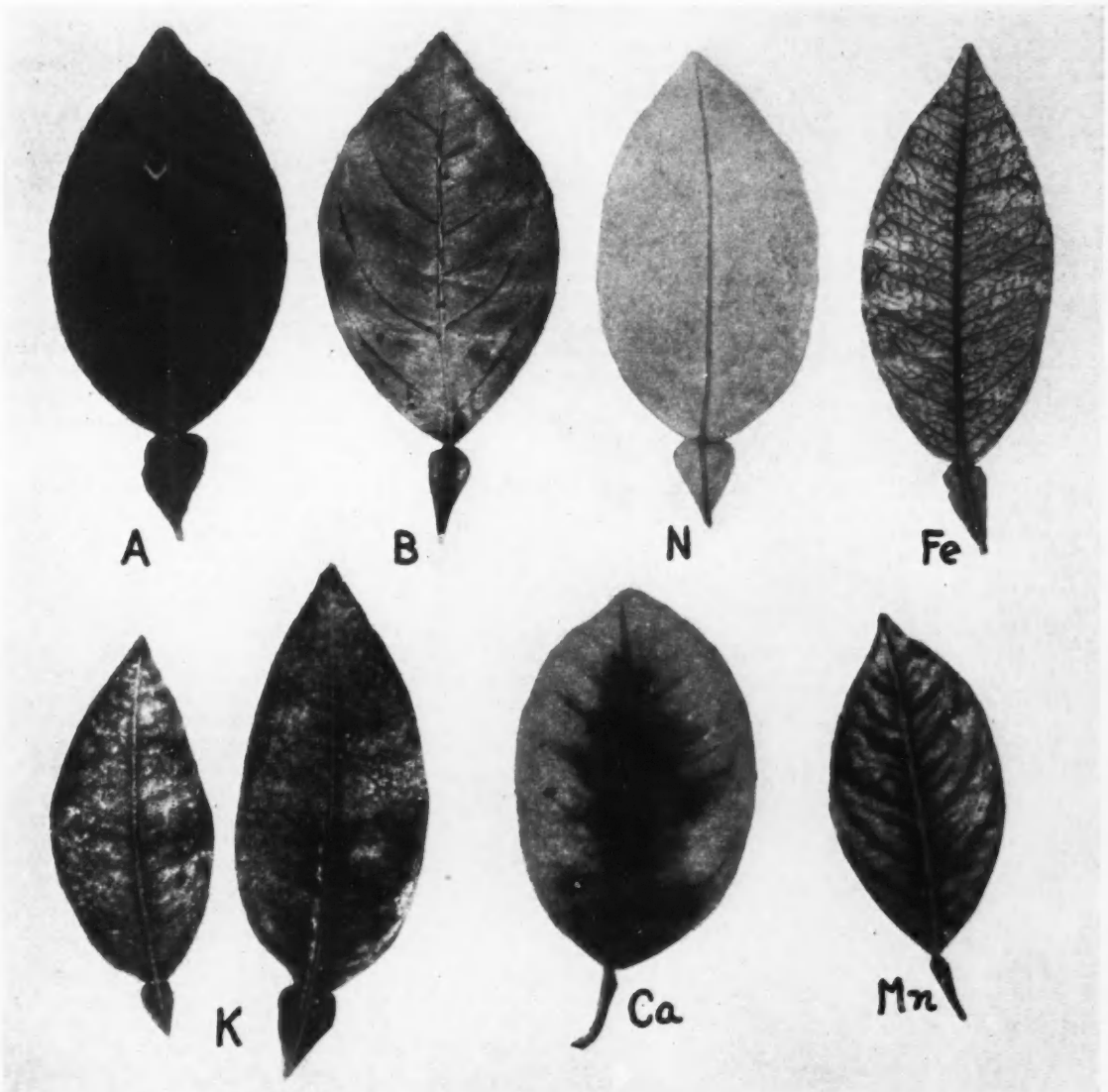
Deficiency symptom patterns of (A) magnesium, left; and (B) zinc, right. Magnesium deficiency is characterized by a gradual fading of chlorophyll on each side of midrib, including lateral veins, until leaf becomes yellowed or bronzed, with chlorophyll usually persisting as an inverted V-shaped area at base of midrib until late stages, when all green color is lost. Zinc deficiency is characterized by a loss of chlorophyll in irregular areas between the lateral veins on each side of the midrib, the tissues immediately adjoining these veins retaining their green color. This results in an irregular variegated effect, usually of vivid contrast designated as "frenching" or mottle-leaf. In the most severe stages the terminal leaves are greatly reduced in size and virtually all chlorophyll is lost.

this trouble readily, particularly where the aggravating soil or cultural conditions are remedied. In view of the response of affected trees to copper it has been assumed that this abnormality may be the result of a copper deficiency. The complexity of the problem, however, indicates that other factors than a defiency of copper may be involved. It is characterized by large, deep green foliage with distorted "S" shaped terminal shoots which in chronic cases frequently develop gum pockets, dark brown staining resulting from a "gum-soaked" condition, and dying back which eventually gives rise to a bushy, rosette type of growth. On the older wood multiple bud formations and ridged, corky, brown eruptions of the bark usually develop. Frequently the fruit is affected, developing brown, glossy, pustular eruptions. In severe cases such fruit may crack or split and drop extensively before maturity.

The symptoms of dieback or exanthema on the fruit are commonly termed "ammoniation" by Florida growers from the supposed relation to the use of ammonia, or nitrogen fertilizers. (6).

(8) Zinc. — Characterized by a partial chlorosis of the leaves in which chlorotic areas, irregular in outline, develop between the main lateral veins. The part immediately next to the midrib and lateral veins remains green, while the chlorophyll

FIGURE II.



Deficiency symptom patterns of (B) boron, (N) nitrogen, (Fe) iron, (K) potassium, (Ca) Calcium and (Mn) manganese compared with (A) normal. **Boron** deficiency is characterized by corking and cracking of veins on upper leaf surface while chlorophyll fades from pale green to yellow golden color. But with **nitrogen** the loss of chlorophyll is uniform, resulting in a general yellowing of entire leaf, while **iron** deficiency is characterized by a chlorotic condition with small veins remaining green longer that leaf tissue producing a marked netting appearance. Without **potassium** the leaf develops small, irregular spots (pustular like) and later becomes bronze to brown rust-like and finally a breaking of tissue (necrotic). In the case of **calcium** deficiency the chlorophyll loss appears first on the edges and tips of leaves with a fading of chlorophyll inward. **Manganese** deficiency is characterized by a subdued mottled effect similar to the early stages of Frenching, but with distinctly less contrast of chlorotic and green leaf parts. Each specimen illustrates a typical stage of deficiency. Earlier and later stages will naturally be somewhat different in degrees of patterns.

disappears or fails to develop appreciably, in the leaf tissue, This results in an irregular mottled or variegated mixture of green, yellow and old ivory colors. This condition is generally termed "Frenching" in Florida and mottleleaf or foliocellosis in California. In slightly affected trees the frenching may occur on leaves of normal size, but in severe cases the terminal leaves are not only very small but extremely narrow and may become almost white. Trees in such cases are stunted and unproductive; and much of the fruit is small, course in texture and below commercial size. This condition produces a dying back of branches followed by multiple buds and bushy or rosete type of growth, suggestive of exanthema which may be associated with zinc deficiency.

"Frenching" or mottle-leaf may occur on any soil but is most common on light sandy soils, particularly when the trees are neglected or subjected to poor cultural practices. Severe or chronic cases are usually associated with over limed soils. It is distinctly more prevalent on oranges and tangerines than on grapefruit. (11, 5).

(9) Manganese. — Characterized by a partial chlorosis of the leaves as in zinc deficiency ,but with a distinctly less vivid contrast between the chlorotic and green parts of the leaves than occurs characteristically with the frenching or mottleleaf effect resulting from zinc deficiency. The symptoms of manganese deficiency might be likened to a mild or subdued form of zinc deficiency, (Figure II). Unlike the latter deficiency however, manganese deficiency does not cause pronounced reduction in leaf size. It is usually found on marly or highly limed soils but may occur on light sands. (9).

(10) Boron. — A condition has been observed frequently in groves in many sections of Florida which agrees closely with a number of the boron deficiency symptoms produced under controlled experimental conditions by Haas in California. It is characterized by a pronounced varicose effect of the veins in which the lateral veins, and occasionally the midribs of the leaves, become conspicously enlarger and corky followed by ruptures and splits on the upper surface. In such cases the veins become more prominent on the upper surface of leaves, whereas the reverse situation occurs in healthy leaves. Frequently the leaves are characterized by a pronounced punkered or crinkly condition which often curl downward or at right angles to midrib. The latter symptom might be confused with aphid injury. In advanced cases the leaves become dull greenish yellow to golden yellow or bronze with a distinctly hard and britle appearance. (8).

It should be borne in mind that these illustrations represent deficiency symptoms which should not be confused with excesses, spray burns, cold injury, or diseases caused by organisms or viruses. Most of these patterns can be observed in the field. In many cases growers already racognize some of the deficiency symptoms and are making the proper correction. In others, however, much time and money are lost through the application of wrong elements. Due to the specific action of the elements one could not expect zinc to alleviate magnesium, manganese, iron or other deficiencies than that of zinc. However, a deficiency of one element (if not corrected), may prevent the benefical action of other elements for other deficiencies.

HOW TO USE THE PLATES

Fortunately, each element produces a similar deficiency pattern on oranges, grapefruit and tangerines. As a rule, a wide range of variation exists in the field and frequently one deficiency symptom may be masked by another indicating a lack of two or more elements. Moreover, the range of variation or stages of deficiency patterns may confuse a grower. However, if reasonable care and caution are taken and typical and representative leaves selected the possibility of recognizing deficiencies will be very good.

The reader will need to remember that the illustrations presented are reproductions in black and white and that, with few exceptions, the green areas of the leaves show black in the patterns and the different shades of black and white indicate proportional degrees of chlorosis. With the description of each deficiency pattern, information is given regarding the general tree condition, types of soil and treatment where the particular deficiency may be expected to occur.

Since abnormal conditions may be produced by a deficiency in any one of several elements or by excessive amounts of the same, the history and treatment of the grove should be taken into consideration when attempting to identify deficiency symptons. In attempting to use the photographs as standards for comparison with the tree conditions in question the following precautions should be taken:

A. Observe the general condition and appearance of the affected trees and leaves.

B. Determine the dominant color of the leaves and deficiency patterns (avoiding cold injury, local and obvious causes) as related to the following:
   (1) Age of abnormal leaves and branches, twigs, fruit, etc.
   (2) Size and shape of leaves and veins in comparison to normal leaves.
   (3) Conditions of terminal branches, whether healthy or abnormal in development gummed, multiple buds, recurved, rosette, dead, etc.
   (4) Condition of fruit as to sixe, texture, and color.

C. Ascertain the typical pattern or patterns of leaf abnormalties and compare with pattern plates, keeping in mind that the different degrees of chlorosis of lack of chlorophyll show in black and white in plates.

Methods of Treating Deficiencies (General)

For the most part, nitrogen phosphoric acid and potassium, deficiencies are taken care of through a regular fertilizer program, but in case deficiencies of these elements deveop, special treatments and modification of the fertilizer formula to increase the amount of the element needed, would be in order.

In regard to calcium deficiency, characteristic leaf symptoms rarely develop in the field but the general effects upon the tree are more common, namely, stunting, hardened condition of the bark, and unresponsiveness to fertilizers. Because of the large need for calcium in the soil, "High calcic" and Dolomitic limestone are the most economic sources of available calcium. As a rule, the trees showing calcium deficiency are on acid soils and should be limed in accordance with the degree of acidity. The amounts of lime needed will vary from 500 to 2,000 or more, pounds per acre, depending on the degree of acidity and soil type. Sufficient lime to produce a pH of about 6.0 usually will take care of most calcium needs.

Where a severe case of bronzing occurs on soils with a reaction above pH 6.0, small amounts of soluble magnesium salts might be advisable but in most cases Dolomitic limestone at the rate of 500 to 1,000 pounds per acre, depending on the acidity, will correct this deficiency. For quick results it is advisable to apply the dolomite along with the nitrogen fertilizer. This hastens the solubility of dolomite and will supply the most economical source of magnesium. When used regularly, dolomite will prevent bronzing of the foliage and improve the general condition of the trees because most citrus soils are low in available calcium and magnesium.

In regard to zinc and copper deficiencies, severe cases should be sprayed with these elements using accepted and proven forms and rates, but in mild cases and for a

maintenance program, soil treatment sat the rate of 0.1 to 1 pound of the sulphates (or equivalents) (each) annually per tree, pending on size and severity, will supply the fruit and tree demands, even when an efficiency of 20 per cent is considered. Of course, when the elements are omitted until symptoms of deficiency develop somewhat larger amounts would be needed.

In the case of manganese and iron deficiencies, soil treatments are perhaps the most satisfactory. On most soils, ¼ to 1 pound each of the sulphates (or equivalents) of these elements will more than supply tree and fruit needs. But on marly and over-limed soils, the efficiency of these elements is lowered, and higher rates would be needed (2 to 5 pounds per tree). An acid fertilizer and organic matter on marly soils will help alleviate the trouble. These salts may be applied satisfactorily in the fertilizer mixture.

In the case of Boron deficiency no treatment has been worked out for citrus. But for other fruit crops 5 to 6 grams of borax inserted in holes in tree trunk have proven beneficial. Moreover, soil treatments at the rate of 5 to 10 pounds of borax per acre has given satisfactory results with other crops. Larger amounts may be used on marly and over-limed soils. A spray containing 1 to 2 pounds of borax per 100 gallons lime sulphur spray might alleviate the deficiency.

It is recognized that boron is toxic when used in large omounts, so are zinc and copper yet, all are needed in small amounts by the tree. If a grower will be cautious there is no more danger with boron than with zinc and copper sprays. Proper amounts of hydrated lime will prevent injury of these elements. This is true when used in soil or spray treatments. If the soil is supplied with calcium and magnesium carbonates injury from soil would be less likely than from spray treatments.

The grower who is able to recognize deficiency symptoms, and treat them early will greatly increase the efficiency of his fertilizer and grove production.

Acknowledgements

The author wishes to take this opportunity to express his sincere appreciation to Messrs. E. F. DeBusk and A. S. Rhoads for critically reading the manuscript and to Dr. A. S. Rhoads for making most of the photographs.

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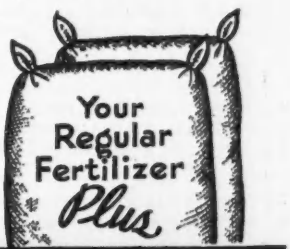

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Control of Powdery Mildew on Crape Myrtle

BY ERDMAN WEST
MYCOLOGIST, FLORIDA
EXPERIMENT STATION

EDITOR'S NOTE

Many citrus groves in Florida are bordered by a row of crape myrtle plants, largely as a matter of adornment or beautification. Owners of groves having such ornamental borders of crape myrtle will be interested in the measures herein recommended for the control of powdery mildew, a disease to which crape myrtle plants are peculiarly susceptible.

Our crape myrtle plants are still dormant. Most of them started to grow earlier in the season but the last cold snap killed the new growth. New buds are sprouting again, and the logical time to control powdery mildew is at hand.

I think all of you know what powdery mildew on crape myrtle looks like. Instead of nice, dark green leaves on the shoots, we have very pale leaves covered with a white powdery or mealy coating. Under the powder, the leaves are distorted and smaller than normal. Sometimes, only a few shoots are affected but where plants are partly shaded, the whole bush may be mildewed. It frequently happens that the flower clusters are attacked too. When this occurs, the buds usually fail to open. Any that do open are distorted, discolored, and unattractive in appearance. They, too, may become covered with the white powder characteristic of the disease.

The disease is usually noticed first on some of the new leaves in the spring as small round white patches. These patches often occur near the center or on the inside branches of the bush. Although they are the first conspicuous signs of the disease, they are not its first appearance. On bushes that were diseased last year, the first indications of the trouble appears on the tiny leaf buds that open on the twigs. If the bush is examined carefully when these buds are about one-fourth of an inch long a very few of them will be found to appear white instead of green. They are covered with a white powder just as the mildewed bushes later in the season. This white powder is a mass of minute spores by which the disease is soon spread to healthy leaves or even to other bushes.

When these little white infected buds are first visible, control measures for the disease should be applied. The best spray to use is commercial liquid lime-sulphur. The concentrated solution can be bought at your local store or farm supply house. It should be diluted with 80 parts of water before applying. Stronger concentrations are likely to cause burning of the plants. Of course, the best time to use the spray is early in the spring just as the buds burst, but it may be applied any time later that the disease is found on your bushes. Other forms of sulphur may be used instead of liquid lime-sulphur. Ordinary dusting sulphur, the finest grade you can get, is quite satisfactory if the disease is not too severe. In fact almost any fungicide containing sulphur will help to control the disease.

Do not stop with one application. About 10 days or two weeks after the first application, another spraying or dusting should be made. The plants should be examined for evidences of the disease at regular intervals and the sulphur applied whenever necessary.

Try to get your neighbors to do the same with their bushes. The more people in the community you can induce to spray for the disease, the less trouble everyone will have with re-infestations.

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This caretaker's groves are in excellent condition, quality of the fruit is well above the average and the quantity may be classified as high to very high. His cost of production per box is approximately 30 cents for oranges, 15 cents for grapefruit.
These costs can be equalled by any caretaking organization or grove owner who will cooperate with us to lower production expense and increase profits.
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CONSTRUCTION BEGINS ON PAN-AMERICAN HERNANDO DE SOTO EXPOSITION

Construction work for the Pan-American Hernando DeSoto exposition to be held in Tampa in 1939 began recently when ground was cleared and work on new buildings at the Florida Fair to house government exhibits was begun.

The new building under construction is a federal project, will follow the Florida-Spanish architecture of the other new buildings, will add more than 2500 square feet to the exhibit space, and will give the Florida Fair 24 large and modern exhibition halls.

The construction is the first step in preparations for the DeSoto Exposition. Active work on the Exposition started as soon at the 30th annual Fair closed.

1. Interstate Commerce Commission
2. Freight Rates

Fertilizer Association Opposes Multiple Freight Rate Increase

Appearing before the Interstate Commerce Commission in the hearing just concluded and pointing out the fact that increased freight rates on fertilizers and fertilizer materials had already been permitted to become effective in the Middle West and Southwest on Dec. 20, 1937, and between the North and South on Jan. 20, 1938, and on cottonseed meal, sulphur, and limestone throughout the country on Dec. 20, 1937, Chas. J. Brand, executive secretary and treasurer of the National Fertilizer Association strongly protested additional increases under the der the Fifteen Per Cent Case of 1937.

While admitting there appeared need for additional revenue for the rail carriers, Mr. Brand pointed out to the Commission that fertilizers and fertilizer materials were exempted from the emergency freight charges which expired December 31, 1936, and that nothing had occurred that would justify any change in the preferential status heretofore granted the farmer in determining the freight rate structure on farm products and farm supplies used to produce crops.

Asserting his belief that increases in freight rates on fertilizers and fertilizer materials would decrease rather than increase rail revenue by diverting still more tonnage to other forms of transportation, Mr. Brand presented the results of several annual surveys showing that in 1931 only 10.8 per cent of the outbound fertilizer traffic moved by truck, 18 per cent moved by truck in 1932 and 31 per cent in 1933, while for the year ended June 30, 1937, more than 46 per cent — probably fully 50 per cent — moved by truck.

A number of tables and charts were introduced as exhibits by Mr. Brand, who also showed that the farmer and the fertilizer manufacturer were being subjected to increases in labor and other costs similar to those affecting rail earnings. He stated neither the farmer nor fertilizer manufacturer could absorb such unwarranted increased freight rates and remain solvent for long.

Another point stressed by Mr. Brand was that each ton of fertilizer shipped from the factory represented a corresponding approximate ton of inbound materials, the final product thus bearing at least two freight increases. He asked the Commission to bear in mind that the increased tonnage of farm crops produced by the use of fertilizers becomes additional revenue tonnage for the carriers and that if too much of the farmer's dollar was taken by freights he buys less fertilizer and produces less crop — a double loss to the carriers.

D. A. Dashiell, Norfolk, Va., chairman of the Traffic Committee of the National Fertilizer Association, also presented testimony at the Washington hearing stressing the cumulative increases if the proposed 15 per cent of Ex Parte 123 were to be superimposed on the increases already in effect under Ex Parte 115. A. J. Whitman and W. W. Manker of the Traffic Committee, submitted data and testimony on the rate structure affecting fertilizer and fertilizer materials at the Chicago hearing.

FLORIDA ORANGE WEEK PROCLAIMED BY GOVERNOR CONE

Orange Week, Fla.

On the eve of the largest national promotion ever arranged to increase the consumption of oranges, Gov. Fred P. Cone proclaimed last week, which started Feb. 24, as "Florida Orange Week" and urged the people of the state to help growers by using more of this fruit.

The Governor's proclamation, released by Chas. H. Walker, Avon Park, chairman of the Florida Orange Growers Committee, directed attention to this season's bountiful crops and described the healthful benefits to be obtained by making oranges and orange juice a regular part of the diet.

189,000 retail grocery stores throughout the country launched a nation-wide drive to increase orange sales Mr. Walker said. Participating in this campaign are the 152,000 stores represented by the Independent Food Distributors Council, and the 37,000 stores represented by the National Association of Food Chains.

Two other weekly orange promotions will be staged by the same retail groups starting March 24 and April 21. These special sales will be similar to last year's successful national grapefruit promotion, in which the chain stores alone are estimated to have spent nearly $2,000,000 in advertising grapefruit.

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THE CONTROL OF THE PECAN SHUCKWORM

(Continued from page 7.)

During normal years this is best done during the first week in March, but the weather recently having been warmer than normal may hasten their emergence. To determine this point examine some of the shucks in your grove and if you find that most of the worms have pupated do this plowing at once.

It is useless to spray for this pest. One might suppose that if the young nuts were covered with an arsenical the worms would be poisoned while biting their way into the nuts, but these worms have the habit of not swallowing the first bites that they take from the nut in digging their way in, that is to say, the hard outside part of the nut is not swallowed but chewed out and thrown away, with the result that worms do not get enough of the poison to kill them. The late Mr. Fred Walker who studied this pest particularly forced several of these worms to eat their way into three nuts in succession, after which they pupated and emerged as normal moths. If biting their way into three nuts heavily coated with lead arsenate will not kill them, certainly biting their way into one nut, as they normally would in a grove, would not hurt them, so spraying is practically useless.

This gathering and burning of the shucks will help control another pecan pest — the pecan twig girdler. This is a beetle which in the fall lays eggs in the twigs of the pecan. The beetle then girdles the twig so as to kill it and thus provide the larvae with dead wood which they must have for food. This girdled twig will fall from the trees sometimes during the fall and winter and the larvae, after completing their growth, will enter the ground to pupate and during the late summer will emerge as beetles to repeat the performance. Gathering up these fallen twigs and burning them is the best way to control the pecan twig girdler. Careful tests by Mr. Walker showed that where this was done in a grove the injury the following year was reduced to about a quarter of that in groves where no control measures were taken. So, when the shucks are raked up pains should be taken to rake up and burn these fallen twigs, thus controlling two pests in one opperation. This twig girdler is also a severe pest of Austrialian pines.

Pecan growers can get from the Experiment Station Bulletin No. 258 on the Pecan Shuckworm, written by Mr. Walker.

Citrus . . .

As An Appetite Stimulant

Miss Mattie Wilroy, home demonstration agent, writing to the Mission, Texas, Times, calls attention to some attractive ways of serving citrus fruits which should prove a valuable aid in stimulating the appetite. Some of the suggestions made by Miss Wilroy are decidedly new and worthy of trial on any table—even on a citrus fruit grower's table.

Since attractiveness in preparation usually creates an appetite and demand, why not try some new recipes for using in the daily menus? says Miss Wilroy, who then continues:

There are many reasons why the fruit should appear often in the daily diet. Nutritional research has shown that a wise use of citrus fruits is certainly beneficial if the particular needs of the system are considered. The organic acids of the fruit increases the flow of saliva and indirectly the gastric juice and aids digestion. The acid increases the secretion of the liver, pancrease and the nuceous lining of the intestine.

They also serve to keep the upper intestine content free from harmful bacteria. Fruits help keep the fluids and tissues of the body in neutral or slightly alkaline condition by supplying minerals, especially calcium, phosphorous and iron and in this way they help to overcome the acid reaction of meat, eggs, and starchy foods. Vitamin C, usually absent in foods other than fresh fruits such as citrus, tomatoes and fresh uncooked leaves are very important in the building and preservation of teeth, is generally supplied. The citrus fruit stimulated an appetite both by the vitamin contents and the attractive flavor and appearance.

Daily citrus fruits are appearing more often on the menus of the American people. Some of the popular recipes using citrus are:

Orange Bread

1½ cups finely cut orange peel, 1 cup of sugar, 1½ cups water.

Parboil peel three times and cook until tender. Drain and add to syrup made of the sugar and water. Cook on low flame until thick but not hard and cool slightly.

1 cup sugar, 1 tablespoon Crisco, 1 egg, a pinch of salt, ½ to 1 cup of sweet milk, 3½ cups flour, 3 teaspoons baking powder.

Cream sugar and shortening, add the well beaten egg. Add alternately the milk and flour (which has been sifted with salt and baking powder. (Be your own judge of a very stiff dough.) Add the marmalade. Chopped nuts may also be added if desired.

Pour in a well greased and floured loaf pan. Let stand 20 minutes and bake 1 hour in a moderate oven.

Orange Frappe

2 cups sugar, 3 cups water, 2 cups orange juice, ½ cup lemon juice.

Boil water and sugar 10 minutes, cool, add fruit juices. Freeze to a mush.

(Continued on page 22.)

DIXIE LIME PRODUCTS COMPANY

Announces

A NEW CHEMICAL AND SPRAY LIME

"DIXIE 400"

A Hydrated Lime Prepared For Chemical and Spray Purposes — 99.25% Through a 400 Mesh Sieve — Will not clog or cut spray nozzles

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OCALA, FLORIDA

MID-SEASON REPORT ON FLORIDA CITRUS

(Continued from page 3.)

period last season.

In summary, Florida orange prices have averaged 29 cents per box lower on the auction markets through February 11 this season than a year ago at the same date; Florida grapefruit prices have averaged 31 cents per box higher, and tangerine prices 32 cents per box higher than for the corresponding period last season.

Among the factors that might have a tendency to strengthen the price of fresh Florida oranges during the remainder of the season are the Government purchase program for oranges to be distributed to relief clients, and the fact that more oranges are being used this season by Florida canneries than ever before.

Through February 18, shipments of 166 cars of Florida oranges, or approximately 66,000 boxes, had been reported as purchases of the Federal Surplus Commodities Corporation for relief purposes. This program is still in progress.

According to A. M Pratt of the Associated Citrus Growers and Shippers, the movement of oranges to canneries up to February 1 this season was 257,000 boxes compared with 127,300 at the same date last year. This doubling of the amount of oranges to canneries, if continued throughout the season, will furnish some relief to the fresh fruit market.

On the other hand, only about two-thirds as much grapefruit had moved to Florida canneries through February 1 this season as compared with the record 1936-37 season at the same date. The comparative figures were 2,169,148 field boxes this season and 3,250,968 field boxes at the same date last season.

Data are not available as to how much the fresh fruit markets may be releived by other methods of citrus disposal in Texas and California. It is understood, however, that an increasing proportion of Texas grapefruit is being sent to canneries, and the Federal Surplus Commodities Corporation is buying a limited amount of California oranges for distribution to relief clients.

Calendar orchards are now being planted by East Hillsborough County home demonstration club women. Miss Irene Riley, home agent, assisted them recently in obtaining a cooperative order for fruit trees.

CITRUS PLANTINGS IN FLORIDA

(Continued from page 6.)

This total, 3,160,159, may be compared to the total increase of 1,740,923 between the years 1931 and 1934, and of 2,307,136 between 1928 and 1931, as shown by the Plant Board's records.

Indicative of the shift in species and varieties within species, since 1928, are the following tabulations: only the principal varieties are listed. The totals, however, include all varieties recorded:

ORANGES

Year	Valencia	Pineapple	Parson Brown	Hamlin	Lue Gim Gong	Unnamed	Miscellaneous	Total
1928-29	285,420	101,362	83,323	60,084	48,943	90,981	29,230	699,343
1929-30	101,383	55,843	27,936	28,969	12,976	59,007	8,917	295,031
1930-31	143,141	48,632	51,847	48,764	20,438	62,821	25,380	401,023
1931-32	181,531	47,207	45,569	69,892	19,907	52,353	13,920	430,379
1932-33	168,283	51,756	46,899	111,064	30,003	73,280	18,394	499,679
1933-34	139,228	53,509	27,761	121,743	23,106	54,938	20,144	440,429
1934-35	122,152	23,027	19,337	109,078	27,566	39,664	10,465	351,289
1935-36	152,071	58,564	27,432	174,686	34,681	68,497	14,633	530,564
1936-37	203,039	63,230	30,763	258,718	44,909	104,037	42,153	746,849
Total	1,496,248	503,130	360,867	982,998	262,529	605,578	183,236	4,394,586

Note:—The foregoing tabulation shows the number of orange trees, by varieties, moved from Florida nurseries from July 1, 1928 to June 30, 1937.

LEMONS

Year	Villa Franca	Perrine	Meyer	Sperriola	Unnamed	Others	Total
1928-29	489		124		1,053	354	2,020
1929-30	353		131		1,124	299	1,907
1930-31	421		785		1,616	209	3,031
1931-32	1,028	36	846		1,565	296	3,771
1932-33	645	853	1,062	223	701	829	4,313
1933-34	361	16,804	1,961	1	1,931	1,380	22,438
1934-35	192	6,800	1,934	716	1,650	194	11,486
1935-36	255	24,134	2,207	294	2,238	344	29,472
1936-37	258	13,777	1,360	9	3,405	572	19,381
Total	4,002	62,404	10,410	1,243	15,283	4,477	97,819

LIMES

Year	Persian	Unnamed	Other	Total
1928-29	5,607	2,559	182	8,348
1929-30	5,425	2,646	476	8,547
1930-31	5,864	4,801	522	11,187
1931-32	11,955	13,075	657	25,687
1932-33	28,939	17,167	1,679	47,785
1933-34	25,806	13,836	974	40,616
1934-35	20,631	11,566	1,468	33,665
1935-36	42,078	17,089	2,040	61,207
1936-37	69,949	34,653	18,452	123,054
Total	216,254	117,392	26,450	360,096

TEMPLES & TANGERINES

Year	Temples	Tangerine	Total
1928-29	17,200	90,488	107,688
1929-30	12,731	45,302	58,033
1930-31	15,348	20,003	35,351
1931-32	26,004	8,730	34,734
1932-33	21,571	10,587	32,158
1933-34	36,995	6,333	43,328
1934-35	16,819	4,934	21,753
1935-36	23,359	6,110	29,469
1936-37	27,790	4,467	32,257
Total	197,817	196,954	394,771

Citrus Commission Favors Enforcement

The Florida Citrus Commission has advised Commissioner of Agriculture Mayo that it favors strict enforcement of the state law prohibiting the use of arsenic on oranges and tangerines, and requested him to revoke the license of any shipper handling arsenated fruit.

The Commission acted after a committee representing the Florida Citrus Exchange, headed by J. W. Sample of Haines City, asked it to define its position on the use of arsenic. In presenting the matter, Mr. Sample declared that it is imperative to the welfare of the industry that the question be settled.

Commissioner Mayo, who under the arsenic law is responsible for its enforcement, told the Commission that he recognized it as the industry's regulatory body, and that he wanted its advice. J. J. Taylor, chief inspector of the Citrus Inspection Bureau, declared in reply to a question that "the law can be enforced."

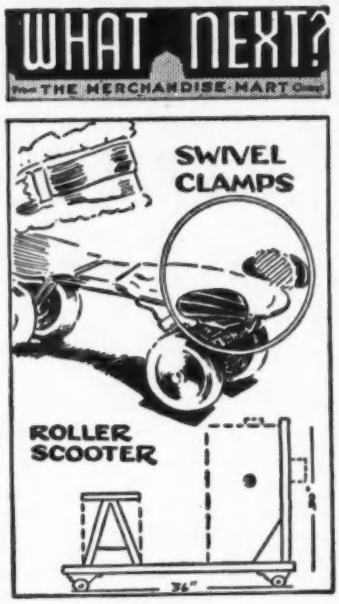
Several Commission members expressed the belief that there is no alternative but to enforce the law. The value of the use of arsenic, upon which there is wide difference of opinion, was only briefly discussed.

The Commission's attorney, Glenn Grimes, advised it that the decision of the United States Supreme Court in upholding the South Carolina motor truck weight law may have far-reaching effect in limiting truck shipments of Florida fruit.

To investigate and determine what may be done to alleviate the South Carolina situation the Commission appointed a special committee, on which it has asked to serve Governor Cone, Commissioner Mayo, Arthur B. Hale, chairman of the State Road Department; L. M. Rhoads, State Marketing Commissioner; W. L. Wilson, director of State Markets; Cary D. Landis, attorney general; W. B. Douglass, member of the State Railroad Commission; Harold Colee, president of the Florida State Chamber of Commerce; John Maxcy, its chairman; and E. Glenn Grimes, its attorney.

The committee met in the governor's office in Tallahassee Monday morning, Feb. 21.

Even an unopposed candidate seldom has the honor and distinction of being elected without a written-in voice of dissent.



Constant improvement in roller skates bespeaks a growing interest in the sport. One such significant improvement is the swivel clamp, illustrated above, which adapts the skate to varying types and sizes of shoes, thus giving the skate a better grip and greatly reduces the possibility of it coming off. The sketch below pictures how a home made roller scooter may be built on the truck section of a skate. Attach truck assemblies to footboard with truck brackets facing each other. Mount a wood steering bar crosswise of front upright. Brace steering post and (an optional seat) as shown. Solid lines in drawing indicate use of boards while the dotted lines indicate use of boxes.

DYE USED IN COLORING CITRUS IS NOT HARMFUL, SAYS SCHWARTZ

The dye used in coloring citrus is no more harmful than the dye used in coloring butter, according to a statement made recently by Dr. Louis Schwartz, medical director of the United States Public Health Service, and a noted specialist in occupational skin diseases.

Last season Dr. Schwartz spent a month in Florida investigating a report that some who handled and ate colored citrus had developed a skin disease. He examined thousands of citrus workers in canneries, packing houses and in groves. He tested workers with the dyes used and found the coloring perfectly safe.

"The coloring used is so harmless that it would not hurt one to eat the peeling or to make marmalade from it," Dr. Schwartz said. "Certainly no one ever contracted skin trouble from this dye. We eat colored butter all the time; well, the coloring used on oranges is just about the same."

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Also List Wealthy Residents of Florida
National Survey Co.
P. O. Box 163
ATLANTA, GA.

CROP PESTS IN 1937

(Continued from page 8)

roasting ear stage, in some cases causing severe loss to the corn. The cotton boll worm was also very destructive in many fields. This is the same insect as the corn ear worm and a survey of the cotton fields which were planted near corn fields usually showed a much heavier infestation than those removed some distance from the corn fields. Undoubtedly it is a good plan to separate cotton and corn as far as possible.

In spite of the warm weather of January, which was favorable to its development, the pepper weevil did practically no commercial damage, except in one or two fields, one of which was a complete loss. The cooperation of the growers in the infested region in the destruction of the infested plants was very evidently responsible for this happy condition of affairs. With continued cooperation it would seem that we should be able to reduce this pest to insignificant numbers, and perhaps we might even be able to exterminate it.

The belted cucumber beetle increased in numbers and did much damage in some fields. This is a comparatively recent immigrant into Florida, coming from the more westerly gulf states. It is a general feeder on all tender truck crops and the study of its life history, hosts, etc., has been taken up by Dr. Wilson of this department, located at the Strawberry Laboratory at Plant City.

The Mexican bean beetle was again discovered in the extreme northern edge of the state. It does not seem likely that this pest will spread to any extent into the main growing sections of the state. It evidently is not adapted to our warm, moist summers.

SCIENTIFIC RESEARCH INTO MEDICINAL VALUE OF CITRUS

(Continued from page 9)

had from the drug chains last season, grapefruit juice was introduced for the first time in many cities as a fountain drink.

"The drug chains found that grapefruit juice is a profitable fountain item. This year's campaign is intended to make it more popular. It will help the sale of Florida grapefruit generally when people sample grapefruit juice at soda fountains and find out how good it is."

This is old Uncle Natchel, known for his homely natural philosophy, and his love for "natchel" things. He's strong for Natural Chilean Nitrate of Soda — "Natchel Sody," as he calls it.

Chilean Nitrate of Soda is *natural* — the *only* natural nitrate. Used for more than a hundred years, on almost every crop, growers continue to show their preference for *natural* nitrate by demanding it year after year.

Use Natural Chilean Nitrate of Soda for your crops. It contains plenty of quick-acting nitrogen, plus more than 30 other vital elements in natural balance and blend.

**"Natchel balance an' blend.
Dat's whut counts."**
Uncle Natchel

NATURAL CHILEAN NITRATE OF SODA

CITRUS AS AN APPETITE STIMULANT

(Continued from page 18.)

Lemon Sherbert

Boil sugar and water together for 5 minutes to make syrup. Add lemon juice, cool, and freeze to a mush. Add stiffly beaten egg whites and finish freezing.

Ambrosia

6 oranges, 3 cups fresh grated coconut, ½ cup sugar.

Peel and slice pulp of oranges. Grate coconut. Place layers of orange pulp in a large bowl. Sprinkle a little sugar and add a layer of coconut, alternately with a layer of orange pulp and sugar. Over all pour juice of oranges and coconut; cover top with grated coconut. Leave in refrigerator until next day and serve.

Suggested Citrus Salads

1. Grapefruit, celery, red or green sweet pepper, French dressing.
2. Grapefruit, celery, pecans or crushed peanuts, French dressing.
3. Grapefruit, 1 cup orange cubes, ½ cup crystallized citrus fruit, 3 tablespoons pecans — fruit salad dressing.
4. Oranges and pineapple cubes with strawberries—French dressing.
5. Orange sections arranged in sections on lettuce, strawberries heaped in center—fruit or cream dressing.
6. Orange sections rolled in coconut, arranged on green leaves and garnished with cherries.
7. One grapefruit, 2 oranges, lettuce, avocado cubes; alternate sections of orange or grapefruit in circles on lettuce, place avocado cubes in center—French dresing.
8. Tangerine cubes, ground pecans—served with fruit dresing.

Iced Orange Appetizer

2 tbs. gelatine, 4 tbs. cold water, 3 cups orange juice, ¾ cup sugar, 2 tbs. lemon juice, 1 cup orange pulp.

Combine gelatine and cold water. Heat 1 cup of the orange juice over hot water, add gelatin and sugar and stir until dissolved. Cool, add rest of fruit juices. Chill several hours, stirring occasionally, and add orange pieces. Serve ice cold as first course. Garnish with mint sprigs.

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The rate for advertisements of this nature is only five cents per word for each insertion. You may count the number of words you have, multiply it by five, and you will have the cost of the advertisement for one insertion. Multiply this by the total number of insertions desired and you will have the total cost. This rate is so low that we cannot charge classified accounts, and would, therefore, appreciate a remittance with order. No advertisement accepted for less than 50 cents.

FOR SALE—2000 Riverside No. 10 Grove Orchard Oil Heaters used only two seasons, excellent condition. 70c each, F.O.B. Marianna subject to prior sale. Marianna Fruit Company, Marianna, Fla.

ALYCE CLOVER SEED. Ripe and cleaned. Ideal cover and hay crop. Write for information. P. E. Synder, Box 866, Lakeland, Fla.

CROTALARIA SPECTABILIS — Fresh crop, $15.00 per 100 lbs. f. o. b. Frostproof, Fla. Milton Woodley, Frostproof, Flo.

FOR SALE—Practically new 25 gal. capacity Hardie super mogul sprayer equipped with 14 h. p. 4 cy. Novo engine, 500 gal. tank mounted on Chev. chassis with dual wheels, ten ply tires. Sprayer used equivalent to one season. Perfect condition. Sprayer cost new $1050 plus present value truck $450. Will sacrifice all for $750 or will trade for smaller sprayer and difference. C. O. Reiff, Marianna, Fla.

Better Growers Use Our Planned Production Program. Designed for your grove. Soil analysis and interpretations. Sound, Safe, Profitable. J. G. LAWTON, Research Chemist, Bartow, Fla., Phone 8804.

"MAIL ORDER Operator desires contact with grower of high grade avocado pears. Have interesting proposition for grower of highest quality fruit." F. R. Gardner, P. O. Box 528, Greenville, Pa.

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CARETAKER WANTED capable of looking after small grove in exchange for free house and electric light. Owner will finance small herd of cows so caretaker can earn living on twenty-three acres. Caretaker's dutes simple requiring equivalent to one day's labor a week. Address Lester Perrine, Rumford Avenue, Waltham, Mass.

CITRUS TREES — Offer about 100 Valencia orange trees, 2 to 2¾ in. caliper, 75c; 150 Duncan grapefruit, 2 to 3½ in. caliper, 65c. On sour stock delivered your truck here. J. K. Christian, McIntosh, Fla. Marion County.

SEEDS—ROUGH LEMON, SOUR ORANGE, CLEOPATRA. Pure, fresh, good germination. Also seedlings lineout size. De Soto Nurseries, DeSoto City, Fla.

SCENIC HIGHWAY NURSERIES has a large stock of early and late grapefruit and oranges. One, two and three year buds. This nursery has been operated since 1888 by G. H. Gibbons, Waverly, Fla.

THRIFTY TREES and budwood from record performance Perrine Lemon parents. Persian Lime and other citrus varieties. DeSoto Nurseries, DeSoto City, Fla.

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THOUSANDS of Rough Lemon Seedlings, six to twenty inches high. $1.50 per hundred; $12.50 per thousand; ten thousand or more at $10.00 per thousand. Strong field grown plants. INDIAN ROCK NURSERIES, Largo, Florida.

Very desirable buds on sour orange root. Valencias, Hamlins and Jaffas. Also sour orange seedlings. Prices on request. Nursery at Blanton, Fla. Copothorn Groves, Inc., "Bob Thornton" and "Rox Pollard". P. O. Box 310, Tampa.

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SEED—Rough lemon, sour orange, cleopatra. New crop from type true parent trees. Also thrifty seedlings. DeSoto Nurseries, DeSoto City, Florida.

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What Price, Cost Of Production?

When everything is averaged up, Florida oranges must bring $2.00 per box, delivered, if growers are to get back cost of production, according to A. M. Pratt, well known citrus statistician and secretary-manager for Associated Citrus Growers & Shippers, in an analysis recently of growing-shipping costs in this state. Grapefruit must bring $1.78 per box, average, and tangerines $2.32 per (full) box — at these figures growers **on the average** will be getting back production costs, he states.

Mr. Pratt has prepared a table of figures showing average operating expenses for citrus. "I believe these figures are as near an accurate average as can be determined at this time," he states. His figures follow:

Average Operating Expense

Oranges

Picking and hauling	.15
Packing	.60
Selling, Advertising, Insp.	.18
Sub. Total	.93
Average freight to Auction Markets	.65
Sub. Total	$.158
Estimated cost of Production	.42
TOTAL	$2.00

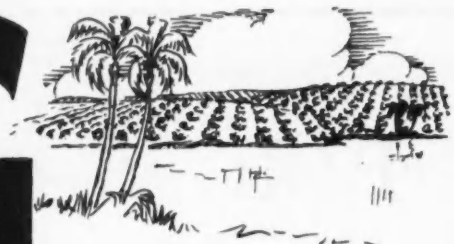
Grapefruit

Picking and hauling	.12
Packing	.51
Selling, Advertising, Insp.	.20
Sub. Total	.83
Average freight to Auction Markets	.65
Sub. Total	$1.48
Estimated Cost of Production	.30
Total	$1.78

Tangerines

Picking and hauling	.18
Packing	.75
Selling, Advertising, Insp.	.22
Sub. Total	$1.15
Average freight to Auction Markets	.67
Sub. Total	$1.82
Estimated Cost of Production	.50
Total	$2.32

(Continued on page 21)



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The GULF FERTILIZER CO., Tampa

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